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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
10/797,784	03/10/2004	Anant Achyut Setlur	GLOZ 2 00169 (RD29342) 4139		
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10/797,784 03/10/2004 Anant Achyut Setlur GLOZ 2 00169 (RD29342) 4139 27885 7590 05/03/2007 FAY SHARPE LLP 1100 SUPERIOR AVENUE, SEVENTH FLOOR CLEVELAND, OH 44114 ART UNIT PAPER NUME 3663	HANNES P				
CLEVELAND,	, ON 44114		ART UNIT	PAPER NUMBER	
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•			05/03/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary		Application No.	Applicant(s)			
		10/797,784	SETLUR ET AL.			
		Examiner	Art Unit			
		Johannes P. Mondt	3663			
The MAILING DATE of this communication appears on the cover sheet with the correspondence address Period for Reply						
WHIC - Exte after - If NC - Failu Any	ORTENED STATUTORY PERIOD FOR REPLY CHEVER IS LONGER, FROM THE MAILING DATE IN THE MAILING THE	ATE OF THIS COMMUNICATION 36(a). In no event, however, may a reply be tim vill apply and will expire SIX (6) MONTHS from cause the application to become ABANDONEI	l. lely filed the mailing date of this communication. D (35 U.S.C. § 133).			
Status						
1)⊠	Responsive to communication(s) filed on <u>02 April 2007</u> .					
2a) <u></u> ☐	This action is FINAL . 2b)⊠ This action is non-final.					
3)□	Since this application is in condition for allowance except for formal matters, prosecution as to the merits is					
	closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11, 453 O.G. 213.					
Disposit	ion of Claims					
	4) Claim(s) 1-34,37-43,45 and 46 is/are pending in the application. 4a) Of the above claim(s) is/are withdrawn from consideration.					
·	5) Claim(s) is/are allowed.					
	Claim(s) <u>1-21,25-34,38-40,43,45 and 46</u> is/are Claim(s) <u>22-24,41 and 42</u> is/are objected to.	rejected.				
	•	r election requirement	·			
8) Claim(s) are subject to restriction and/or election requirement.						
Applicat	ion Papers					
9)☐ The specification is objected to by the Examiner.						
10) ☐ The drawing(s) filed on is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.						
	Applicant may not request that any objection to the					
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d). 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.						
Priority (under 35 U.S.C. § 119					
12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f). a) All b) Some * c) None of:						
1. Certified copies of the priority documents have been received.						
2. Certified copies of the priority documents have been received in Application No						
3. Copies of the certified copies of the priority documents have been received in this National Stage						
application from the International Bureau (PCT Rule 17.2(a)).						
* See the attached detailed Office action for a list of the certified copies not received.						
Attachmen	ıt(s)					
1) Notic	ce of References Cited (PTO-892)	4) Interview Summary				
	ce of Draftsperson's Patent Drawing Review (PTO-948) mation Disclosure Statement(s) (PTO/SB/08)	Paper No(s)/Mail Da 5) Notice of Informal Pa				
	er No(s)/Mail Date	6) Other:	•			

DETAILED ACTION

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Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/2/07 has been entered.

Response to Amendment

Amendment filed 4/2/07 with said Request for Continued Examination forms the basis for this Office Action. In said Amendment Applicants substantially amended 1-13, 27-34, and 37-43; cancelled claims 35, 36 and 44; and added new claim 46. Comments on Remarks submitted with said Amendment are included below under "Response to Arguments".

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 1-13 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the final wording "and/or Mg₄FGeO₆:Mn⁴⁺" fails to state in a definite manner to which phosphor or combination of phosphors Mg₄FGeO₆:Mn⁴⁺ may be added or included as

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replacement of said phosphor or combination of phosphors. Therefore, the claims are indefinite through the absence of defined meets and bounds.

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2. Claims 27-34 and 37-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Specifically, although both (Sr_{0.95}Ba_{0.025}Eu_{0.025})2SiO₄ and (Sr_{0.58}Ba_{0.36}Eu_{0.06})2SiO₄ have been disclosed separately, a blend thereof has not been disclosed. Therefore, the amendment constitutes new matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
- 1. Claims 1-7, 12, 13 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al (as cited previously) and Ohara et al (6,168,892 B1).

N.B.: This rejection is made subject to the noted indefiniteness, and based on the assumption that Mg4FgeO6:Mn4+ is an alternative to any of the red phosphors and does not need to be comprised in the claimed phosphor composition.

On claim 1: Srivastava et al teach a semiconductor light source 11 or 1; see Figures 2-5 and 7) having a peak emission in a range from 370 nm – 390 nm (because this range is completely within the UV range; see "1. The Radiation Source", pages 10-11, especially line 7 of page 11).

Srivastava et al also teach the conversion of the primary light into a mixture of red, blue and green light (see abstract).

Srivastava et al do not necessarily teach the limitation on specific phosphor composition as claimed. However, it would have been obvious to include said limitation in view of Ohara et al, who, in a patent on forming color images and color mixing, teach the inclusion of Y₃Al₅O₁₂ (col. 6, line 9), Ba₂SiO₄:Eu²⁺ (col. 6, line 50) and a phosphor comprising the phosphor Sr₂P₂O₇:Eu²⁺, while teaching that activators / co- activators may be selected from any of the group comprising Eu, Mn, Ce, inter alia (col. 6, l. 6-7). Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

On claim 2: the light source is an LED (page 11, first paragraph).

On claim 3: the LED active region may comprise a p-n junction comprising GaN, AlGaN and InGaN semiconductor layers (page 11, first paragraph), hence said p-n junction can be characterized as an $In_iGa_jAI_kN$ layer with $0 \le i$, $0 \le j$; $0 \le k$, i+j+k=1.

On claim 4: the lighting apparatus by Srivastava is also disclosed as an organic emissive structure, in particular: OLED (page 11, second paragraph).

On claim 5: the phosphor composition is coated on the surface of the light source (coating 46; see page 24 and Figure 7).

On claim 6: the lighting apparatus further comprises an encapsulant 19 surrounding the light source 11 and the phosphor composition 21 (pages 22-23 and Figure 4).

On claim 7: the phosphor is dispersed in the encapsulant (Figure 4 and loc.cit.).

On claim 12: said phosphor composition further comprises one or more additional phosphor(s) (see "2. First Phosphor", pages 11-12; "4. Third Phosphor", pages 15-18; and "5. Optional Fourth Phosphor", pages 18-19).

On claim 13: said one or more additional phosphors are selected from the claimed group, for instance (Ba,Sr,Ca)MgP₂O₇:Eu²⁺,Mn²⁺. See page 12, lines 5-9).

On claim 45: said semiconductor light source has a peak emission at about 405 nm (namely: in the ranger 370 nm – 390 nm).

2. Claims 14-16, 18-21, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bokor et al in view of Schaepkens et al (US 2004/0051444 A1) and either Lowden et al (cited in previous action) or Wyner et al (EP 0 087.745 A1). As detailed above, Bokor et al teach a light-emitting apparatus capable of emitting white light comprising:

a UV light source emitting radiation having a peak emission in the UV range and a phosphor composition radiatively coupled to the light source, the phosphor composition comprising (Sr,Ba,Ca)₂SiO₄:Eu (see rejection over Bokor et al under 35 USC 102(b) overleaf).

Bokor et al do not necessarily teach the phosphor composition to also comprise one or more garnet phosphors and a magnesium fluorogermanate with formulae as claimed.

However, it would have been obvious to include said one or more garnet phosphors and magnesium fluorogermanate as claimed in view of Schaepkens et al, who, in a patent application on lighting apparatus (see title and abstract) including color conversion of primary light from light emitting apparatus (see [0037]-[0044]), hence analogous art, teach the inclusion of both a garnet phosphor having the general formula as claimed (see [0037]) for the specific purpose of absorption of the primary radiation including UV radiation at 390 nm (hence in the range around the peak wavelength of the light source of Bokor et al) and subsequent emission in the green-to-red portion of the spectrum, and a magnesium fluorogermanate ([0039]) for the purpose of absorption of the primary radiation in a range comprising the peak wavelength of Bokor et al (namely in a range from 300 nm to 500 nm; see [0037]) and subsequent emission of red light ([0039]). Motivation to include both the garnet and magnesium fluorogermanate phosphors immediately derives from the suitability of said phosphors for conversion of UV light to produce components in the spectrum supplementing the mainly blue-green component emitted by the (Sr,Ba,Ca)₂SiO₄:Eu phosphor so as to approach white light, which is the common goal of the primary references (see Bokor et al, [0001]-[0002]).

Neither of the above references necessarily teach the specific formula for the magnesium fluorogermanate as claimed. However, as witnessed for instance by

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Lowden et al or Wyner et al, the selection of the specific magnesium fluorogermanate having the specific formula Mg₄FGeO₆:Mn has long been used as red phosphor, for the very purpose of down-conversion for which the magnesium fluorogermanate by Schaepkens is used. *Applicant is reminded that a prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art, as is the case here between the stoichiometric ratios between the atoms forming the germanium fluorogermanates, or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

On claim 15: the lighting apparatus is an LED (title).

On claim 16: the LED comprises a nitride compound semiconductor represented by the formula $In_iGa_iAl_kN$, $0 \le k$, and I+j=k. See [0013]).

On claim 18: the phosphor composition is coated on the surface of the light source (the coating being 5 comprising 6 ([0027])).

On claim 19: the lighting apparatus further comprises an encapsulant 5 ([0027]) surrounding the light source 1 and the phosphor composition 6.

On claim 20: the phosphor composition is dispersed in the encapsulant (Figure 1 and [0027]).

On claim 21: the lighting apparatus further comprises a reflector cup (see Figure 1, and reflecting walls 17 ([0027]).

On claim25: said phosphor composition further comprises necessarily at least one additional phosphor because inclusion of (Sr,Ba)SiO4:Eu2+ needs to be combined with at least one phosphor in the blue portion of the emission spectrum ([0028] and [0032])..

On claim 26: said one or more additional phosphors are selected from the blueemitting phosphors 2, 4 and 6 in Table 4, inter alia: (Ba,Sr,Ca)₅(PO4)₃(Cl,F,Br,OH):Eu²⁺ (No.2 in Table 4, for zero content of Ca and the selection of Cl), and (Ba,Sr,Ca)MgAl₁₀O₁₇:Eu²⁺,Mn²⁺ (for zero content of Ca and Mn).

3. Claims 14-20, 25-26, 40 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Srivastava et al (WO 01/89001 A2) (cited previously) in view of Schaepkens et al (US 2004/0051444 A1) (cited previously) and either Lowden et al (cited in previous action) or Wyner et al (EP 0 087 745 A1) (cited previously).

On claims 14 and 40: As detailed above, Srivastava et al teach a semiconductor light source 11 or 1; see Figures 2-5 and 7) having a peak emission in a range from 370 nm – 390 nm (because this range is completely within the UV range; see "1. The Radiation Source", pages 10-11, especially line 7 of page 11), and

a phosphor composition radiatively coupled to the light source (see pages 11-20), the phosphor composition comprising (Ba,Sr,Ca)₂ SiO₄:Eu (see "3. Second Phosphor", pages 13-15, especially 13, lines 20-26).

Srivastava et al do not necessarily teach the phosphor composition to also comprise one or more garnet phosphors and a magnesium fluorogermanate with formulae as claimed.

However, it would have been obvious to include said one or more garnet phosphors and magnesium fluorogermanate as claimed in view of Schaepkens et al, who, in a patent application on lighting apparatus (see title and abstract) including color conversion of primary light from light emitting apparatus (see [0037]-[0044]), hence analogous art, teach the inclusion of both a garnet phosphor having the general formula as claimed (see [0037]) for the specific purpose of absorption of the primary radiation including UV radiation at 390 nm (hence in the range around the peak wavelength of the light source of Srivastava et al) and subsequent emission in the green-to-red portion of the spectrum, and a magnesium fluorogermanate ([0039]) for the purpose of absorption of the primary radiation in a range comprising the peak wavelength of Srivastava et al. Motivation to include both the garnet and magnesium fluorogermanate phosphors immediately derives from the suitability of said phosphors for conversion of UV light to produce components in the spectrum supplementing the mainly blue-green component emitted by the (Sr,Ba,Ca)₂SiO₄:Eu phosphor so as to approach white light, which is the common goal of the primary references (see Srivastava et al, "Background of the Invention", page 1).

Neither of the above references necessarily teach the specific formula for the magnesium fluorogermanate as claimed. However, as witnessed for instance by Lowden et al or Wyner et al, the selection of the specific magnesium fluorogermanate

having the specific formula Mg₄FGeO₆:Mn has long been used as red phosphor, for the very purpose of down-conversion for which the magnesium fluorogermanate by Schaepkens is used. *Applicant is reminded that a prima facie case of obviousness* typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art, as is the case here between the stoichiometric ratios between the atoms forming the germanium fluorogermanates, or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

Finally, the phosphor blend as recited by <u>claim 40</u> is herewith also made obvious, because the combined invention implies the phosphor blend including (Ba,Sr,Ca)₂ SiO₄:Eu, Mg4FgeO6:Mn4+ and both the garnet phosphor having the general formula as claimed and the magnesium fluorogermanate having the claimed formula.

On claim 15: the light source is a semiconductor LED (page 11, first paragraph).

On claim 16: the LED active region may comprise a p-n junction comprising GaN, AlGaN and InGaN semiconductor layers (page 11, first paragraph), hence said p-n junction can be characterized as an $ln_iGa_iAl_kN$ layer with $0 \le i$, $0 \le i$; $0 \le k$, i+j+k=1.

On claim 17: the lighting apparatus by Srivastava is also disclosed as an organic emissive structure, in particular: OLED (page 11, second paragraph).

On claim 18: the phosphor composition is coated on the surface of the light source (coating 46; see page 24 and Figure 7).

On claim 19: the lighting apparatus further comprises an encapsulant 19 surrounding the light source 11 and the phosphor composition 21 (pages 22-23 and Figure 4).

On claim 20: the phosphor is dispersed in the encapsulant (Figure 4 and loc.cit.).

On claim 25: said phosphor composition further comprises one or more additional phosphor(s) (see "2. First Phosphor", pages 11-12; "4. Third Phosphor", pages 15-18; and "5. Optional Fourth Phosphor", pages 18-19).

On claim 26: said one or more additional phosphors are selected from the claimed group, for instance (Ba,Sr,Ca)MgP₂O₇:Eu²⁺,Mn²⁺. See page 12, lines 5-9).

On claim 43: Srivastava's invention is using said phosphor blend to absorb radiation emitted by a light source with a peak emission in the UV range and emitting radiation that, when combined with said radiation from said light source produces white light (see "1. Radiation Source", page 10 final lines on primary source spectrum and "Background of the Invention", pages 1-4 on the overall production of white light).

4. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over

Srivastava et al (WO 01/89001 A2) (previously cited and made of record) in view

of Ohara et al (6,168,892 B1).

Srivastava et al teach a semiconductor light source 11 or 1; see Figures 2-5 and 7) having a peak emission in a range from 370 nm – 390 nm (because this range is completely within the UV range; see "1. The Radiation Source", pages 10-11, especially line 7 of page 11).

Srivastava et al also teach the conversion of the primary light into a mixture of red, blue and green light (see abstract).

Srivastava et al do not necessarily teach the limitation on specific phosphor composition as claimed. However, it would have been obvious to include said limitation in view of Ohara et al, who, in a patent on forming color images and color mixing, teach the inclusion of Y₃Al₅O₁₂ (col. 6, line 9), Ba₂SiO₄:Eu²⁺ (col. 6, line 50) and a phosphor comprising the phosphor Sr₂P₂O₇:Eu²⁺, while teaching that activators / co- activators may be selected from any of the group comprising Eu, Mn, Ce, inter alia (col. 6, l. 6-7). Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

Allowable Subject Matter

1. Claims 22-24, 41 and 42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Strictly within the context of the inventions as defined by independent claims 14 or 40, the composition with the specific stoichiometric parameter values and cxx and ccy values as limited by the further limitations defined by claims 41 or 42 have not been found in the prior art, nor are they obvious over the prior art, nor has a phosphor with

the composition by either the further limitation of claim 22, claim 23 or claim 24 been found in or been determined obvious over the prior art.

Response to Arguments

Applicant's arguments filed 4/2/07 have been fully considered but they are not persuasive. Specifically,

Ad A, on claim rejections under 35 USC 112, despite the amendment to claims 1-13 and counter to Applicant's implication that the amendment's rewording would overcome said rejections, the final wording "and/or Mg₄FGeO₆:Mn⁴⁺" fails to reveal in a definite manner to which phosphor or group of phosphors Mq₄FGeO₆:Mn⁴⁺ is claimed as alternative.

Ad B, on the rejection of claims 27-33, 38 and 39 as anticipated over Srivastava, and the rejection of claims 27-29, 31-34 and 38-39 as anticipated by Bokor: the amendment appears to introduce new matter, because although both $(Sr_{0.95}Ba_{0.025}Eu_{0.025})2SiO_4$ and $(Sr_{0.58}Ba_{0.36}Eu_{0.06})2SiO_4$ have been disclosed separately, a blend thereof has not been disclosed. Therefore, the amendment constitutes new matter.

Ad C, on the rejections of claims 1-7, 12, 13, 14-20, 25-26, 40, 43 and 45 as unpatentable over Srivastava in view of Schaepkens and either Lowden or Wyner, Applicants argument of an improper combination of Srivastava with Shaepkens (Schaepkens, i.e.) is not persuasive: In response to applicant's argument that Schaepkens is nonanalogous art, it has been held that a prior art reference must either

be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See In re Oetiker, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992) (see MPEP, 707.07(f), 7-37-04). In this case, Schaepkens' teaching is on phosphor selection, the purpose of the phosphor being identical to the purpose of the phosphor selected by both Applicant and Srivastava, i.e., changing the wavelength of light emitted by a light source, and hence Schaepkens is indeed reasonably pertinent to the problem Srivastava and Applicant try to solve, namely the problem of how to change the wavelength in the light emitted by a light source to achieve optimal characteristics of the resulting overall light emission. That Schaepkens, as alleged by Applicant, "is NOT directed to a lighting apparatus for providing illumination" (page 10 of Remarks) is contradicted by the nature of electroluminescent devices and their use for display, because electroluminescence devices are light sources and because display implies the process of illumination. That LED devices and EL devices are constructed completely differently is irrelevant for at least two reasons: the claims by Applicant are drawn to a product rather than a method, while as explained overleaf all that is required to show proper combination is that the secondary reference is reasonably pertinent to the problem of Applicant's concern. That, as alleged by Applicant, "phosphors suitable for use in LED devices are not necessarily suitable for use in LED based lighting devices" (page 11) "to a number of factors including phosphor efficiency, saturation effects, and intensity of the produced light" is wholly unsubstantiated by either detailed explanation or reference, while the

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efficiency, saturation and intensity from an a prior view cannot be considered to

influence the phosphor's suitability in any but the very highest power levels in which

optics becomes non-linear, because a phosphor's entire effect consists of absorption of

a photon and subsequent emission of another photon.

For the same reasons as given above for the combinability of Srivastava with

Schaepkens, Applicant's argument in traverse of the combination with either Lowden or

Wyner (page 12) are not persuasive: both Lowden and Wyner are combinable with

Srivastava: both Wyner and Lowden use the phosphor to down-convert light to a red

portion of the spectrum; so does Applicant and Srivastava.

Ad D, on the rejections over Bokor in view of Schaepkens and either Lowden or

Wyner: Applicant's arguments are (as presented and as admitted by Applicant) "the

same" as the reasons outlined above with respect to Srivastava, Lowden and Wyner.

Examiner thus refers to the reasons why said arguments are not persuasive as given

above under "Ad C"). In this respect it is added that Bokor is analogous to Srivastava

and to Applicant's invention, which is not contested by Applicant.

A discussion "Ad E" is missing in the Remarks, and examiner assumes this to be

merely a numbering problem.

Ad F, claim 44 has been withdrawn.

Finally, claim 46 has been examined for the first and earliest time possible.

Conclusion

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Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Johannes P. Mondt whose telephone number is 571-

272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

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supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JPM

April 30, 2007

Primary Examiner:

manges Mondt (Art Unit: 3663)